



**National Aeronautics and  
Space Administration**

**August 15, 2000**

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**NRA-00-OES-06**

# **RESEARCH ANNOUNCEMENT**

**CONVECTION AND MOISTURE EXPERIMENT (CAMEX) INVESTIGATIONS**

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**Notice of Intent Due September 15, 2000  
Proposals Due October 16, 2000**

**OMB Approval No. 2700-0087**

**CONVECTION AND MOISTURE EXPERIMENT (CAMEX) INVESTIGATIONS**

**NASA Research Announcement  
Soliciting Research Proposals  
for  
Period Ending  
October 16, 2000**

**NRA 00-OES-06  
Issued August 15, 2000**

**Office of Earth Science  
National Aeronautics and Space Administration  
Washington, DC 20546**

## **RESEARCH ANNOUNCEMENT FOR CONVECTION AND MOISTURE EXPERIMENT (CAMEX) INVESTIGATIONS**

### **INTRODUCTION**

The National Aeronautics and Space Administration (NASA) announces the solicitation of research proposals to conduct scientific investigations in connection with Convection and Moisture Experiments (CAMEX) consistent with the science goals of NASA's Earth Science Enterprise. The primary focus of this NRA is to seek research proposals related to the next convection and moisture experiment in the CAMEX series i.e. CAMEX-4. The CAMEX-4 field campaign will be conducted during the months of August and September 2001. Sensor validation experiments that are synergistic with CAMEX and are related to NASA Earth Science satellite missions can also be proposed.

The mission of NASA's Earth Science Enterprise (ESE) is to develop a scientific understanding of the Earth system and its response to natural or human-induced changes and improve prediction capabilities for climate, weather, and natural hazards. The Earth science research program aims to acquire a deeper understanding of the Earth system by describing how its component parts and their interactions have evolved, how they function, and how they may be expected to continue to evolve on all time scales. The challenge is to develop the capability to predict those changes that will occur in the future, both naturally and in response to human activity. These interactions occur on a continuum of spatial and temporal scales ranging from short-term weather to long-term climate, and from local and regional to global scales. The Enterprise also seeks to provide accurate assessments of changes in the composition of the atmosphere, the extent and health of the world's forest, grassland, and agricultural resources, and geologic phenomena that can cause natural hazards.

In general, the Enterprise aims to provide Scientific answers to five challenging but scientifically important Earth system science (ESS) questions:

- Earth's natural variability: how is the global Earth system changing?
- Forcing factors: what are the primary forcings of the Earth system?
- Response to disturbances: how does the Earth system respond to natural and human-induced changes?
- Consequences: what are the consequences of change in the Earth system for human civilization?
- Prediction: how well can we predict changes in the Earth system that will take place in the future?

NASA policy is to work cooperatively with other U.S. government agencies and our international partners in the development of a comprehensive capability to observe and understand the Earth. In addition, both National and NASA policy require NASA to support private-sector investment in commercial space activities by committing the U.S. government to purchase commercially available goods and services. NASA will not develop a mission that in

any significant way competes with or duplicates planned commercial capabilities. Instead NASA will purchase commercially available data and services as long as they meet its scientific and technical needs and they are cost effective.

Over the past decades, the Earth Science Enterprise (ESE) and antecedent programs, such as Mission to Planet Earth, have made major investments in space-based and sub-orbital observations, model development, infrastructure and research conducted by the broad scientific community to address these scientific issues. In particular, NASA and partner agencies launched the Tropical Rainfall Measuring Mission (TRMM) in November 1997, Quikscat in June 1999, and in December 1999 the Terra (EOS-AM) mission, the flagship of the Earth Observing System (EOS) program. This will be followed in 2001 by the launch of the Aqua (EOS-PM), Jason and QuickTOMS missions. These spacecraft and associated field campaigns are expected to usher a new era of integrated scientific studies of the Earth system, as envisioned in the original plans for EOS and the US Global Change Research Program. Validation studies relating to the TRMM, Quikscat, Terra and Aqua missions can also be proposed under the auspices of this NRA as long as the proposed experiments also contribute to the scientific objectives of CAMEX. Validation proposals that have already been submitted in response to NRA-00-OES-03 will not be considered.

Accurate forecasting of weather is of considerable significance for the protection of lives and property. Improving the accuracy of short-term predictions and increasing the period of validity of long-range forecasts has great practical interest and is a scientific challenge. While weather prediction is the primary responsibility of operational agencies such as NOAA, scientific advances made in developing more accurate models, as well as more effective methods for ingesting new types of observations, are directly applicable to the improvement of operational forecasting systems. The principal thrusts of the ESE's cooperation with operational weather services are: (1) participation in the development of precursor operational instruments for application to various operational environmental satellite systems, (2) development of new data products originated from space-based observing systems, (3) participation in field campaigns, and collaboration in the development of and experimentation with improved atmospheric models, coupled ocean-atmosphere models, and data assimilation schemes.

A more specific objective of NASA's ESE is the understanding of the relationship between climate change and the frequency/intensity of weather disturbances, which play a disproportionately large role in atmospheric transport and mixing, energy transformations, cloud system development, and precipitation. A first step towards predicting the future of the Earth system is building a capability to simulate realistically the present state and short-term variations of the global environment. Understanding and predicting fast processes (the development of weather systems) may be essential in order to quantify longer-term average impacts. Further development of experimental prediction of specific events that can be verified by observations is a fundamental research tool for understanding these fast processes and their contributions to changes in climate.

The atmospheric Dynamics and Thermodynamics Program of OES has keen interest in key aspects of the tropical environment and supports a program for systematic global atmospheric measurements which specifically includes global temperature, water vapor, and precipitation

used for understanding short-term variability of climate and physical processes. From an applications perspective, global temperature and moisture, in addition to winds, are primary state variables for initializing numerical weather prediction models. Consistent and accurate global temperature and moisture records are essential for identifying transient climatic variations and long-term trends, as well as more subtle changes such as variations in vertical stratification, or stability, of the atmosphere. Thus, a key objective is the advancement of the measurement technology for atmospheric moisture and other state variables associated with convection. The use of improved and more complete measurements over the life cycle of tropical storms is helpful in understanding these atmospheric phenomenon and is also useful for calibrating research and operational satellite observations.

Early on, NASA sponsored field programs called the Convection and Moisture Experiment (CAMEX) at Wallops Island, Virginia. The scientific objectives of these field programs included measurements of temperature, water vapor, clouds, precipitation, and electric fields associated with tropical convection.

More recently with the development of sophisticated new airborne radar and lidar sensors to study temperature, moisture, precipitation and wind fields, it was felt that the time was ripe to carry out a mission which was designed to study mesoscale cloud systems, notably hurricanes. Planning for the CAMEX-3 began in early 1997. CAMEX-3 was based at Patrick Air Force Base, Florida from 6 August to 23 September, 1998. This field campaign was carried out in close cooperation with the Hurricane Research Division of the National Oceanic and Atmospheric Administration (NOAA/HRD). CAMEX-3 successfully studied Hurricanes Bonnie, Danielle, Earl and Georges and collected data for research in cyclone development, motion, intensification, and impacts upon landfall using aircraft and surface remote sensing and in-situ instrumentation. This study has yielded high spatial and temporal information of hurricane structure, dynamics, and motion. These data, when analyzed along with complementary aircraft, satellite, and ground-based radar observations, should provide additional insight to hurricane modelers and forecasters who continually strive to improve hurricane predictions.

In addition to contributing to key NASA science objectives related to climate and global change studies, the CAMEX program is emerging as a major scientific component of a multi-agency effort to observe tropical cyclone formation, motion and intensification, and improve the prediction of hurricane behavior near landfall. The CAMEX program, as a participant in the multi-agency US Weather Research Program (USWRP), will focus heavily on their hurricane landfall science objectives. The USWRP Implementation Plan for Hurricanes Landfall (available at <http://uswrp.mmm.ucar.edu/uswrp.html>) outlines the research necessary to achieve USWRP science goals leading to improved hurricane landfall forecasts. Central to these plans are field campaigns with coordinated efforts among participating agencies to collect data sets for understanding the structure and evolution of hurricanes prior to and during landfall and for use in advanced numerical weather prediction and data assimilation systems. Partners include NOAA, NSF, the U. S. Navy, and the university research community. It is anticipated that CAMEX will be closely coordinated with the observational facilities of the NOAA/Hurricane Research Division and the USWRP. Overarching objectives for a multi-agency field campaign will include, in addition to the CAMEX aircraft and surface-based observations, observations taken

by NOAA with their aircraft and by NSF supported land-based observations including mobile radars, wind profilers, and meteorological towers.

## **THIS NRA**

The primary focus of this NRA is to seek research proposals related to the next convection and moisture experiment in the CAMEX series. This experiment will be designed to gather evidence to help in finding answers to the following three targeted questions: (1) is the global cycle through the atmosphere accelerating? (2) how are variations in local weather, precipitation and water resources related to global climate change? and (3) to what extent can weather forecasting be improved by new global observations and advances in satellite data assimilation?

The CAMEX program is expected to continue to evolve toward more advanced field and model studies of critical weather systems over their full life cycles, principally by means of dedicated aircraft campaigns. The next experiment in the series, CAMEX-4, will be conducted during the months of August and September 2001. The experimental region will be similar to CAMEX-3, i.e., Atlantic Ocean adjoining the U.S. East Coast, the Caribbean Sea and the Gulf of Mexico. Although the final decision awaits further negotiations, current planning is to base the aircraft and operations center at Homestead Air Reserve Station, just south of Miami, Florida. Proposers should assume this location of the operations center for the purpose of developing their proposals and budget.

NASA has unique capabilities with which to observe and study the essential atmospheric constituents both through aircraft and satellite remote sensing, and with in-situ aircraft and ground measurements. The major thrust of CAMEX to date has been to utilize NASA's DC-8 and ER-2 aircraft with contributions from the Tropical Rainfall Measurement Mission (TRMM) and ground-based measurements. The aircraft, based at Dryden Flight Research Center (DFRC), carry multi-instrument payloads to measure all the important physical parameters of interest to CAMEX and needed for associated process studies, data input for models, and data with which to calibrate or verify satellite observations. A description of the NASA aircraft is available at <http://www.dfrc.nasa.gov/airsci>.

A key aspect of CAMEX-4 will be continuation of the collaboration begun during CAMEX-3 with NOAA's Hurricane Research Division (HRD) and Aircraft Operations Center (AOC). It is anticipated that NOAA aircraft will fly many coordinated missions with the ER-2 and DC-8. Qualified CAMEX investigators may approach HRD during the winter of 2001 to integrate their scientific objectives into NOAA's mission planning. There is also expected to be a limited opportunity for flying NASA instruments on the NOAA aircraft, subject to weight, balance, and engineering integration considerations. To integrate NASA instruments on NOAA aircraft, early coordination by all participants will be necessary. Proposals to cover these integration costs can be made to NASA under this NRA.

This solicitation seeks research proposals that address observations and research associated with severe tropical convection with emphasis on the energetics of hurricanes and how their investigation can lead to better landfall forecasts, including the track, wind structure (intensity),

and precipitation. The most important observations for CAMEX-4 airborne observations are those variables that will contribute most directly to hurricane forecasting.

The CAMEX-4 research areas of interest include: 1) observation and modeling of processes related to rapid intensification (or weakening) of tropical cyclones; 2) observational and modeling studies of storm movement, especially near landfall; 3) remote sensing technique development and validation related to wind, temperature, and moisture observations in tropical cyclones and their environment; and 4) structure (including microphysics) and dynamics of tropical convective systems. Technical details and information for the scope of investigations sought can be found in Appendix A.

This NRA is open to all scientific investigators who submit proposals that respond to the objectives of the program, and meet the other requirements stated in this Announcement. Awards will be made for a period of up to 3 years for approved projects. Funding at a level of approximately \$2.5 million per year is expected to be available for this solicitation. It is anticipated that an average NASA award will be funded in the range of \$100,000 to \$150,000 per year.

Participation in the program is open to all categories of domestic and foreign organizations, including educational institutions, industry, non-profit institutions, NASA centers, and other U.S. agencies. In accordance with NASA policy as described in Appendix B, all investigations by foreign participants will be conducted on a no-exchange-of-funds basis, i.e., investigators whose home institution is outside the United States cannot be funded by NASA.

Proposals may be submitted at any time during the period ending October 16, 2000. NASA reserves the right to consider proposals received after that date in accordance with Appendix B, paragraph 11, i.e., "the selecting official deems the late proposal to offer significant technical advantage or cost reduction." Proposals submitted to NASA will be evaluated using scientific peer review. Proposals selected for funding will be announced during December 2000 for initiation in March 2001.

All prospective proposers are *strongly* encouraged to submit a notice of intent in response to this NRA. This will facilitate planning of the peer review process. The notice of intent should be submitted by September 15, 2000 via email to [OESresponse@hq.nasa.gov](mailto:OESresponse@hq.nasa.gov) or fax to 202-479-0511. The notice of intent should include the following information:

- NRA number
- PI and Co-I names and addresses (including zip + 4)
- Title of proposal
- Telephone and fax numbers of PI
- Email address
- Brief summary of the proposed work (not to exceed 300 words)

Technical information contained in Appendix A applies to this Research Announcement only. Appendices B through F contain NASA general guidelines for the preparation of proposals solicited by this Research Announcement.

**Identifier:** NRA 00-OES-06

**Submit Notice of Intent to:** Electronic Mail:  
OESresponse@hq.nasa.gov  
Conventional Mail:  
NASA Peer Review Services, Code Y  
CAMEX Proposals  
500 E Street, SW, Suite 200  
Washington, DC 20024-2760  
Fax: 202-479-0511

**Submit Proposals to:** NASA Peer Review Services, Code Y  
CAMEX Proposals  
500 E Street, SW, Suite 200  
Washington, DC 20024-2760  
(For overnight delivery purposes only, the  
recipient telephone number is 202-479-9030)

**Number of Copies Required:** 10

**Selecting Official:** Dr. Jack A. Kaye, Director  
Research Division  
Office of Earth Science  
NASA Headquarters

**Obtain Additional Information  
from:** Dr. Ramesh Kakar, Manager  
Atmospheric Dynamics and  
Thermodynamics Program  
Code YS  
NASA Headquarters  
Washington, DC 20546  
Telephone: 202-358-0240  
FAX: 202-358-2770  
Email: [Ramesh.Kakar@hq.nasa.gov](mailto:Ramesh.Kakar@hq.nasa.gov)

Please use identifier number NRA-00-OES-06 when making an inquiry regarding this Announcement. Your interest and cooperation in participating in this effort are appreciated.

ORIGINAL SIGNED BY

Dr. Ghassem Asrar  
Associate Administrator, Office of Earth Science

## **APPENDIX A**

### **CONVECTION AND MOISTURE EXPERIMENT (CAMEX)**

#### **I. TECHNICAL DESCRIPTION**

A significant challenge identified by the ESE Science Implementation Plan is that of relating the large-scale atmospheric circulation to the life cycle of mesoscale storms (e.g., hurricanes) and other severe weather systems, and then understanding how that relationship might change in a future climate. Additionally, the answer to the fundamental question, “Is the global cycling of water through the atmosphere accelerating?” requires that we understand the global energy and water cycle. Hurricanes are a key component of this cycle and produce intense exchanges of energy and water within the atmosphere, and between the atmosphere and the ocean. Another challenge is that of deriving quantitative precipitation predictions from weather forecasting models. These topics are central objectives of the U.S. Weather Research Program (USWRP). The special observational requirements to address these objectives are the measurement of the three-dimensional structure of atmospheric temperature, moisture, and winds around storms. Other developmental observations (e.g., lightning) may also reveal important new information regarding thunderstorms, severe weather, and rainfall.

The observation of these parameters is crucial to the goals and objectives of NASA’s ESE and Atmospheric Dynamics programs. It also contributes directly and importantly to the stated goals of the multi-agency USWRP which is to investigate storm dynamics and energetics with the necessary observations and models to improve hurricane tracking and their intensity at landfall.

The specific USWRP Hurricane Landfall program goals are:

- Reduce landfall track and intensity forecast errors by 20 percent;
- Increase warning leadtime to and beyond 24 hours with 95 percent confidence without increasing the present 3 to 1 overwarning;
- Make skillful (compared to persistence) forecast of gale- and hurricane-force wind radii out to 48 hours with 95 percent confidence; and
- Extend quantitative precipitation forecasts to 3 days and improve skill of day-3 forecasts to improve inland flooding forecasts.

Again, more information on USWRP science goals can be found at <http://uswrp.mmm.ucar.edu/uswrp.html>

Atmospheric temperature and moisture are the primary indicators of the state of the atmosphere. Consistent and accurate global temperature and moisture records are essential for identifying transient climatic variations and long-term trends, as well as more subtle changes such as variations in the vertical stratification of stability of the atmosphere. From an application perspective, global winds, temperature, and moisture are the primary state variables for

initializing numerical weather prediction models. The interests of NASA's Earth Sciences research in this area are similar to many of the goals and objectives of the USWRP and NOAA's Hurricane Research Division. A fundamental need of the USWRP is not only the state variables associated with severe tropical storms but the accompanying dynamics, energetics, and precipitation as well.

As indicated in the introduction, a significant challenge identified by the ESE Research Strategy is that of relating the large-scale atmospheric circulation to the life cycle of mesoscale storms (e.g., hurricanes) and other severe weather systems and then understanding how that relationship might change in a future climate. To this end, detailed quantitative measurements of parameters such as precipitation, clouds, hydrometeors, lightning, and the three-dimensional structure of atmospheric temperature, moisture, and winds around tropical storms are required.

Specific science questions that emerge for NASA's ESE and Atmospheric Dynamics Program and which relate strongly, if not always directly, to USWRP science questions are:

- How do the large-scale distributions of moisture and temperature (stability) impact the life cycle and structure of intense mesoscale convective systems, and what are the character and impacts of heat, moisture, and momentum transports within the convective systems on their larger-scale environment?
- What is the four-dimensional distribution of precipitation within mesoscale convective systems and the associated distribution of latent heat release? What is the relationship between precipitation and changes in the boundary conditions at the Earth's surface (e.g., sea-surface temperatures, surface winds)?
- How are brightness temperatures measured by aircraft active and passive microwave instruments related to satellite retrieved microphysical properties and surface rainfall of tropical precipitating systems?
- What are the electrical properties of precipitation bands in tropical precipitating systems? Why are some rainbands more electrically active than others? How are the microphysical properties of electrically active clouds different from less electrically active clouds?

The CAMEX program is expected to continue to evolve toward more advanced field and model studies of critical weather systems over their full life cycles, principally by means of dedicated aircraft campaigns. Key science objectives will continue to be:

- Study of dynamical and microphysical processes in convective cloud systems associated with tropical storms, fronts, and monsoons that can cause severe weather and floods;
- Model representation of precipitation processes in cloud-scale, mesoscale, and global models; and

- Impact of assimilating space-based observations of precipitation and associated parameters on rainfall prediction skill in mid-latitude and tropical weather systems.

NASA's Earth Science Enterprise has adopted commercial data purchases as a mainstream way of acquiring research-quality data as these commercial capabilities become available. NASA encourages the use of commercially available data sets by Principal Investigators as long as they meet the scientific requirements and are cost-effective. When responding to a NASA Research Announcement the proposer should identify the commercial data sources intended for use and the associated cost.

## **II. MISSION BACKGROUND:**

NASA has unique capabilities with which to observe and study the essential atmospheric constituents both through aircraft and satellite remote sensing, and with *in-situ* aircraft and ground measurements. The major thrust of CAMEX to date has been to utilize NASA's DC-8 and ER-2 aircraft with contributions from ground-based and the Tropical Rainfall Measuring Mission (TRMM) satellite measurements. The aircraft, based at Dryden Flight Research Center (DFRC), carry multi-instrument payloads to measure all the important physical parameters of interest to CAMEX and needed for associated process studies, data input for models, and data with which to calibrate or verify satellite observations.

## **III. CAMEX-3 INVESTIGATIONS**

CAMEX-3, conducted by NASA in cooperation with NOAA, collected observations of high-spatial and temporal resolution to characterize the 3-dimensional structure, motions, and dynamics of successive Atlantic hurricanes during 1998. CAMEX-3 was conducted coincident with a TRMM field campaign in Florida. The TRMM field campaign was named TEFLUN for TE<sub>X</sub>as FL<sub>O</sub>rida UN<sub>D</sub>erflights (for TRMM). Details concerning instrumentation, individual instrument science objectives, data availability, and products can be found at <http://ghrc.msfc.nasa.gov/camex3>. Similarly data availability from TRMM-TEFLUN observations can be found at <http://trmm.gsfc.nasa.gov/trmm-office/field-campaign/teflun/teflun.html>.

## **IV. CAMEX-4 MISSION**

As indicated in the introduction, the primary thrust of this NRA is directed toward a follow-on mission to CAMEX-3. The CAMEX-4 field campaign will be conducted during the months of August and September 2001. The experimental region will be similar to CAMEX-3, i.e., Atlantic Ocean adjoining the U.S. East Coast, the Caribbean Sea, and the Gulf of Mexico. Although no firm arrangements have been made, current planning is to base the aircraft and operations center at McDill Air Force Base, just outside of Tampa, Florida.

The most important observations for CAMEX-4 airborne observations are also those variables that will contribute most directly to hurricane forecasting. The CAMEX-4 research areas

include: 1) observation and modeling of processes related to rapid intensification (or weakening) of tropical cyclones; 2) observational and modeling studies of storm movement, especially near landfall; 3) remote sensing technique development and validation related to wind, temperature, and moisture observations in tropical cyclones and their environment; 4) structure (including microphysics) and dynamics of tropical convective systems; and 5) scale interactions between intense convection and mesoscale systems. A fundamental process in hurricane dynamics is the diabatic heating which is directly related to the moisture field and associated phase changes between water vapor, liquid water, and ice. Thus, concentration on high-quality measurements of water vapor and precipitation with the associated temperature field is of high priority. Other microphysical variables, e.g., ice and cloud particles, are important also for related storm intensification models, cloud models, etc. While most of these observations are expected to be made through remote sensing, much of the vertical structure in the proximity of hurricanes will be obtained with the help of dropsondes deployed from participating aircraft. In addition to airborne observations, substantial ground-based measurements are also a high priority, especially the enhanced coverage of atmospheric soundings from established radiosonde stations in the vicinity of the CAMEX-4 experimental region.

It is anticipated that field measurements will be complemented by continued development of appropriate mesoscale atmospheric models (horizontal grid size on the order of 1-15 km). Also, assimilation systems will be developed for model initialization using 3-dimensional air motion data, temperature and water vapor data, radar reflectivity and/or inferred microphysical properties of cloud particles, and surface rainfall.

## **A. Proposal Scope**

Proposals for CAMEX-4 are expected to include both airborne and ground-based measurement investigations as well as science studies utilizing the data, e.g., modeling studies, case studies, satellite intercomparison studies, and studies utilizing complementary aircraft and ground-based observations. A high degree of integration of the airborne and ground-based observations both with satellite data and with modeling investigations is an important element of CAMEX-4, and indeed, is required in order to address the major science objectives. Experimental and theoretical investigations that emphasize such integration are encouraged. Validation studies relating to the TRMM, Quickscat, Terra and Aqua missions can also be proposed under the auspices of this NRA as long as the proposed experiments also contribute to the scientific objectives of CAMEX. Validation proposals that have already been submitted in response to NRA-00-OES-03 will not be considered.

Proposals for Mission Scientist and Mission Meteorologist(s) are solicited, but such proposals should be a part of a broader experimental, theoretical, or data analysis proposal to participate in the mission. Proposers for Mission Scientist will be assumed to be willing to serve as Deputy Mission Scientist, unless they state otherwise.

This NRA does not solicit the development of new instrumentation nor does time permit an extensive integration period for instrumentation that has not previously flown. Proposals that would require the acquisition of significant computer hardware and software in order to complete the proposed investigations also are not solicited by this NRA. Proposals for extensive model

development, or long-term ground-based measurements will be non-responsive to this NRA. Proposals for experimental investigations that clearly lack the required measurement sensitivity or otherwise unsuitable for operation onboard aircraft also will be non-responsive.

## **B. Science Team**

The CAMEX-4 Science Team will be composed of: (1) the selected Principal Investigators for experimental proposals approved for the DC-8 and/or for the ER-2 components of the mission or any other aircraft participating in CAMEX-4; and (2) any Principal Investigators selected for theoretical studies. The term of participation on the Science Team will continue for one year after the completion of the CAMEX-4 field campaign.

The Science Team will be chaired by the Mission Scientist or Deputy Mission Scientist. Individuals proposing an experimental or theoretical investigation may also propose to serve as Mission Scientist or Deputy Mission Scientist.

The Science Team will: 1) determine its own structure and method for interactions among Team Members and the DC-8 and ER-2 aircraft mission managers to achieve the mission objectives and the goals of the CAMEX-4 mission; 2) develop detailed plans to conduct the CAMEX-4 mission to meet the objectives; and, 3) be responsible for establishing a data management and data protocol plan that will promote the timely publication and dissemination of scientific results in accordance with data handling policies of the OES. The data policy for OES projects requires that data be made available to the public after a brief period of exclusive use by science teams for validation of the data, which for the CAMEX-4 mission shall be no more than 6 months after return from the field deployment.

## **C. Additional Information**

The array of science instruments that have been flown before on the DC-8 and ER-2 during CAMEX-3 can be reviewed on the CAMEX-3 web site identified above. Also, airborne science information, standard meteorological data, flight parameter data, etc., can be found on the Dryden Flight Research Center web site: <http://www.dfrc.nasa.gov/Projects/airscience/general>. Other instruments that are known to be compatible with those aircraft may also be found at the same web site or from the individual web addresses listed under logistic requirements.

Typical flight plans that may be of assistance in planning airborne investigations also can be found at the CAMEX-3 web site. It is anticipated that CAMEX-4 will again be done in cooperation with NOAA/HRD. If this occurs, it may be possible to add some instruments of interest to CAMEX-4 on the NOAA P-3 aircraft. Therefore, proposals for this possibility will be considered provided the potential proposers have obtained a formal approval from NOAA to the effect that their instruments will be allowed onboard the NOAA aircraft. Operational planning for CAMEX-4 will be essentially along the lines of what was done for the highly successful CAMEX-3 mission.

Implementation of the CAMEX-4 mission will require airborne experimental investigators to be at the Dryden Flight Research Facility for DC-8 and ER-2 instrument integration. It is

anticipated that the aircraft will be deployed in the field for a period of approximately 6 weeks. Another 4 weeks should be set aside for the purpose of instrument integration and downloading.

## **D. Logistical Support Requirements**

All proposals should include an appendix describing and defining in detail the logistical requirements associated with the proposed investigation. As a minimum, this appendix should provide information relative to the airborne instrumentation, field personnel required, and shipping. The minimum requirements should be defined in each of the following areas:

### **1. Airborne Instrumentation:**

Each DC-8 investigation should, as a minimum, define:

- (1) the amount of rack space that will be required;
- (2) power required (e.g., 110v, 220v, 3-phase, 60hz, 400hz, and 28vdc);
- (3) description of inlets/exhausts and/or optical window(s) required;
- (4) size and number of compressed gas bottles, coolers, pumps, etc., that will be required to be mounted externally to the rack space defined in (1) above; and
- (5) cooling flow rate and temperature required to sustain continuous operations under all flight conditions.

Similar kinds of requirements for ER-2 proposed instrumentation must also be included in the proposal. **As a general guideline, one footlocker size container (24x24x40 inches), weighing no more than 150 lbs., will be allocated to each investigator team for storage of spare parts for instruments aboard the DC-8.** All ER-2 spare parts containers will be shipped to the deployment sites. The proposal should clearly define the volume and weight of all equipment/supplies that will be required to support the deployment of each investigator team, whether shipped on the DC-8, in advance, or coincident with the deployment of the DC-8 and the ER-2.

Information regarding the size of instrument racks, power, and general operation of instrumentation aboard the DC-8 and aircraft can be obtained by contacting:

Mr. Christopher R. Miller  
NASA/Dryden Flight Research Center  
MS 1623H  
Edwards, CA 93523-0273 USA

e-mail: [chris.miller@dfrc.nasa.gov](mailto:chris.miller@dfrc.nasa.gov)  
Telephone: 661-258-2482  
FAX: 661-277-7746

For DC-8 information the web address is:

<http://www.dfrc.nasa.gov/Projects/airscience/general/dc-8/dc8page.html>

The contact person for the ER-2 aircraft is:

Mr. Robert Jones  
NASA/Dryden Flight Research Center  
MS 1623H  
Edwards, CA 93523-0273 USA

e-mail: [robert.jones@dfrc.nasa.gov](mailto:robert.jones@dfrc.nasa.gov)  
Telephone: 661-276-2169  
FAX: 661-276-3719

For ER-2 information the web address is:

<http://www.dfrc.nasa.gov/Projects/airspace/general/er-2/index.html>

2. Personnel/Travel:

The number of individuals required to operate the proposed instrumentation during flight operations, and the number, if any, of additional non-flight personnel required during the field deployment of CAMEX-4, should be defined along with their proposed schedule for integration and deployment. Travel costs for each participant (except civil service employees) should be included as a separate line item in the proposed budget. The mission Project Manager will be responsible for allocation of investigator seats aboard the DC-8.

3. Shipping:

An estimate of the volume and weight of the equipment that will be required to be shipped to each respective integration site should be provided. In addition, an estimate of the volume and weight of additional equipment or special items, such as compressed gases, that will be required to be shipped to each intensive deployment site should be identified.

4. Miscellaneous:

Special requirements, such as, the need for liquid nitrogen, dry ice, helium, etc., at the integration sites and/or during the CAMEX-4 deployment should be defined. Other non-standard operating procedures and requirements should also be discussed.

5. Supply similar logistical information, as applicable, for surface-based investigations.

Specific Guidelines:

Proposals should not exceed 15 pages of single-spaced standard font of size 12 , exclusive of title, abstract, references, vitae, budget information, and certificates. (Vitae should not exceed 3 pages per investigator, including publications.) A work plan, which describes the specific tasks for each year of the proposal, should be included as part of the text. Proposals should be self-contained and should not refer to other material, such as websites on the internet. If color figures are included, they should be included in all copies provided. Attached preprints and reprints of publications and reports will be ignored in the review process. To facilitate recycling, proposals should be prepared without binders or plastic covers.

Costs for acquisition, storage, or processing of data should be included, as well as for any ancillary data and supercomputer utilization costs. If any data are desired that can be made available through the “data buy” activity of the NASA Commercial Remote Sensing Program (CRSP), this should be stated clearly. The CRSP can be accessed at:  
<http://www.crsp.ssc.nasa.gov/databuy/dbmain.htm>.

Proposals will be subjected to both mail and panel reviews. Approved proposals will be funded in installments (typically annually) for a period of up to 3 years, subject to demonstrated satisfactory performance and the availability of funds.

In addition to the requirements of Appendix B, all proposals should include a list of other U.S. government agency support for principal investigator and any co-investigators. In cases where a proposer has other support from the NASA Office of Earth Science, a clear statement of the relationship between this proposal and other NASA funding should be provided.

APPENDIX B: Instructions for responding to NASA Research Announcements (NRA)

APPENDIX C: Proposal cover sheet

Certifications, Disclosures, and Assurances regarding lobbying, debarment and suspension, and drug-free workplace requirements

APPENDIX D: Budget summary

APPENDIX E: Notice of Intent

## APPENDIX B

### INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS

#### NASA Federal Acquisition Regulation (FAR), Supplement (NFS) Part 1852.235-72 , Effective JANUARY 2000

(a) **General.**

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRAs contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRAs.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement. Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

(b) **NRA-Specific Items.** Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

(c) The following information is needed to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater

detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

**(1) Transmittal Letter or Prefatory Material.**

- (i) The legal name and address of the organization and specific division or campus identification if part of a larger organization;
- (ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;
- (iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;
- (iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;
- (v) Identification of other organizations that are currently evaluating a proposal for the same efforts;
- (vi) Identification of the NRA, by number and title, to which the proposal is responding;
- (vii) Dollar amount requested, desired starting date, and duration of project;
- (viii) Date of submission; and
- (ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

**(2) Restriction on Use and Disclosure of Proposal Information.** Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

**Notice**

**Restriction on Use and Disclosure of Proposal Information**

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

**(3) Abstract.** Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

**(4) Project Description.**

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) **Management Approach.** For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) **Personnel.** The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) **Facilities and Equipment.**

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

(8) **Proposed Costs (U.S. Proposals Only).**

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges;

consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(iv) Use of NASA funds--NASA funding may not be used for foreign research efforts at any level, whether as a collaborator or a subcontract. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted. Additionally, in accordance with the National Space Transportation Policy, use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis.

(9) **Security.** Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) **Current Support.** For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) **Special Matters.**

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(ii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

(d) **Renewal Proposals.**

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

(e) **Length.** Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

(f) **Joint Proposals.**

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

(g) **Late Proposals.** Proposals or proposal modifications received after the latest date specified for receipt may be considered if a significant reduction in cost to the Government is probable or if there are significant technical advantages, as compared with proposals previously received.

(h) **Withdrawal.** Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

(i) **Evaluation Factors.**

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

(j) **Evaluation Techniques.** Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are

evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

(k) **Selection for Award.**

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

(l) **Additional Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

(1) NASA welcomes proposals from outside the U.S. However, foreign entities are generally **not eligible for funding from NASA. Therefore, unless otherwise noted in the NRA, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration** with a U.S. institution, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

(2) **All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the NRA. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date. Those received after the closing date will be treated in accordance with paragraph (g) of this provision. Sponsoring foreign government agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected.**

(3) **Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities.**

(4) **Depending on the nature and extent of the proposed cooperation, these arrangements may entail:**

- (i) An exchange of letters between NASA and the foreign sponsor; or
- (ii) A formal Agency-to-Agency Memorandum of Understanding

**(MOU).**

**(m) Export Control Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

- (1) Foreign proposals and proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations, e.g., 22 CFR Parts 120-130 and 15 CFR Parts 730-774, as applicable to the circumstances surrounding the particular foreign participation. The discussion must describe in detail the proposed foreign participation and is to include, but not limited to, whether or not the foreign participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available at <http://www.pmdtc.org> and <http://www.bxa.doc.gov>. Proposers are advised that under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130.

**(n) Cancellation of NRA.**

- (1) NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

**(End of provision)**

## Appendix C

### Proposal Cover Sheet

NASA Research Announcement 00-OES-06

Proposal No. \_\_\_\_\_ (Leave Blank for NASA Use)

Title: \_\_\_\_\_

Principal Investigator: \_\_\_\_\_

Department: \_\_\_\_\_

Institution: \_\_\_\_\_

Street/PO Box: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Country: \_\_\_\_\_ Congressional District: \_\_\_\_\_  
(used for database sorting purposes only)

E-mail: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Co-Investigators:

Name

Institution & Email Address

Address & Telephone

_____	_____	_____
_____	_____	_____
_____	_____	_____

Budget:

1st Year: \_\_\_\_\_ 2nd Year: \_\_\_\_\_ 3rd Year: \_\_\_\_\_ Total: \_\_\_\_\_

#### Certification of Compliance with Applicable Executive Orders and U.S. Code

By submitting the proposal identified in this *Cover Sheet/Proposal Summary* in response to this Research Announcement, the Authorizing Official of the proposing institution (or the individual proposer if there is no proposing institution) as identified below:

- certifies that the statements made in this proposal are true and complete to the best of his/her knowledge;
- agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal; and
- confirms compliance with all provisions, rules, and stipulations set forth in the two Certifications contained in this NRA [namely, (i) *Certification of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs*, and

*(ii) Certifications, Disclosures, And Assurances Regarding Lobbying and Debarment & Suspension].*

Willful provision of false information in this proposal and/or its supporting documents, or in reports required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1001).

Title of Authorizing Institutional Official: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name of Proposing Institution: \_\_\_\_\_

Telephone: \_\_\_\_\_ E-mail: \_\_\_\_\_ Facsimile: \_\_\_\_\_

## **Certification of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs**

The (*Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant "*) hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1972 (20 U.S.C. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, and transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which it retains ownership or possession of the property. In all other cases, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

this assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognizes and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear on the Proposal Cover Sheet above are authorized to sign on behalf of the Applicant.

## **CERTIFICATIONS, DISCLOSURES, AND ASSURANCES REGARDING LOBBYING AND DEBARMENT & SUSPENSION**

### **1. LOBBYING**

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 14 CFR Part 1271, as defined at 14 CFR Subparts 1271.110 and 1260.117, with each submission that initiates agency consideration of such applicant for award of a Federal contract, grant, or cooperative agreement exceeding \$ 100,000, the applicant must **certify** that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit a Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

### **2. GOVERNMENTWIDE DEBARMENT AND SUSPENSION**

As required by Executive Order 12549, and implemented at 14 CFR 1260.510, for prospective participants in primary covered transactions, as defined at 14 CFR Subparts 1265.510 and 1260.117—

(1) The prospective primary participant **certifies** to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency.

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (l)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

## APPENDIX D

### BUDGET SUMMARY

For period from \_\_\_\_\_ to \_\_\_\_\_

- Provide a complete Budget Summary for year one and separate estimated for each subsequent year.
- Enter the proposed estimated costs in Column A (Columns B & C for NASA use only).
- Provide as attachments detailed computations of all estimates in each cost category with narratives as required to fully explain each proposed cost. See *Instructions For Budget Summary* on following page for details.

	A	B	C
		<b>NASA USE ONLY</b>	
1. <u>Direct Labor</u> (salaries, wages, and fringe benefits)	_____	_____	_____
2. <u>Other Direct Costs:</u>			
a. Subcontracts	_____	_____	_____
b. Consultants	_____	_____	_____
c. Equipment	_____	_____	_____
d. Supplies	_____	_____	_____
e. Travel	_____	_____	_____
f. Other	_____	_____	_____
3. <u>Facilities and Administrative Costs</u>	_____	_____	_____
4. <u>Other Applicable Costs:</u>	_____	_____	_____
5. <u>SUBTOTAL--Estimated Costs</u>	_____	_____	_____
6. <u>Less Proposed Cost Sharing</u> (if any)	_____	_____	_____
7. <u>Carryover Funds</u> (if any)			
a. Anticipated amount : _____			
b. Amount used to reduce budget	_____	_____	_____
8. <u>Total Estimated Costs</u>	_____	_____	XXXXXXXX
9. APPROVED BUDGET	XXXXXX	XXXXXXXX	_____

## INSTRUCTIONS FOR BUDGET SUMMARY

1. Direct Labor (salaries, wages, and fringe benefits): Attachments should list the number and titles of personnel, amounts of time to be devoted to the grant, and rates of pay.
2. Other Direct Costs:
  - a. Subcontracts: Attachments should describe the work to be subcontracted, estimated amount, recipient (if known), and the reason for subcontracting.
  - b. Consultants: Identify consultants to be used, why they are necessary, the time they will spend on the project, and rates of pay (not to exceed the equivalent of the daily rate for Level IV of the Executive Schedule, exclusive of expenses and indirect costs).
  - c. Equipment: List separately. Explain the need for items costing more than \$5,000. Describe basis for estimated cost. General purpose equipment is not allowable as a direct cost unless specifically approved by the NASA Grant Officer. Any equipment purchase requested to be made as a direct charge under this award must include the equipment description, how it will be used in the conduct of the basic research proposed and why it cannot be purchased with indirect funds.
  - d. Supplies: Provide general categories of needed supplies, the method of acquisition, and the estimated cost.
  - e. Travel: Describe the purpose of the proposed travel in relation to the grant and provide the basis of estimate, including information on destination and number of travelers where known.
  - f. Other: Enter the total of direct costs not covered by 2a through 2e. Attach an itemized list explaining the need for each item and the basis for the estimate.
3. Facilities and Administrative (F&A) Costs: Identify F&A cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate. Provide the name, address, and telephone number of the Federal agency official having cognizance. If unapproved rates are used, explain why, and include the computational basis for the indirect expense pool and corresponding allocation base for each rate.
4. Other Applicable Costs: Enter total explaining the need for each item.
5. Subtotal-Estimated Costs: Enter the sum of items 1 through 4.
6. Less Proposed Cost Sharing (if any): Enter any amount proposed. If cost sharing is based on specific cost items, identify each item and amount in an attachment.
7. Carryover Funds (if any): Enter the dollar amount of any funds expected to be available for carryover from the prior budget period. Identify how the funds will be used if they are not used to reduce the budget. NASA officials will decide whether to use all or part of the anticipated carryover to reduce the budget (not applicable to

2nd-year and subsequent-year budgets submitted for award of a multiple year award).

8. Total Estimated Costs: Enter the total after subtracting items 6 and 7b from item 5.

## **Appendix E**

### **Notice of Intent**

All prospective proposers are strongly encouraged to submit a notice of intent in response to this announcement. This will allow us to alert a peer review staff to adequately cover the proposal review process. You may email your notice of intent to [OESresponse@hq.nasa.gov](mailto:OESresponse@hq.nasa.gov) or FAX it to 202-479-0511 with the following information:

- PI and CoI names and addresses, (including Zip + 4);
- Title of proposal;
- Telephone number;
- Fax number;
- Email address; and
- A brief summary of what you plan to propose (Please limit this to no more than 3000 characters).